

**EXHAUST TUBE OF INTERNAL COMBUSTION ENGINE**

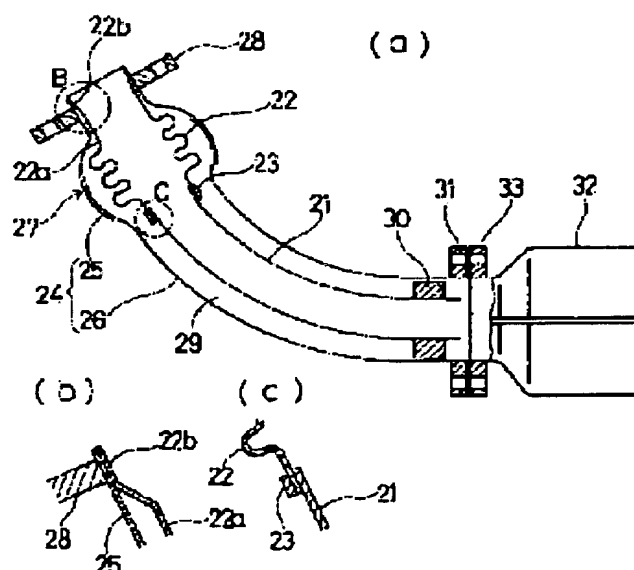
**Patent number:** JP6336921  
**Publication date:** 1994-12-06  
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**Applicant:** SANGO CO LTD  
**Classification:**  
- **international:** F01N7/08; F01N7/14; F16L27/04; F16L59/153  
- **european:**  
**Application number:** JP19930126616 19930528  
**Priority number(s):**

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**Abstract of JP6336921**

**PURPOSE:** To improve the exhaust purifying performance by retraining the temperature decrease in exhaust gas in cold time and at the time of starting an engine, and provide both of improved exhaust purifying performance and vibration absorbing performance.

**CONSTITUTION:** A part of thin thickness inner tube 21 is constituted of a thin thickness bellows 22. In a thick thickness outer tube 24, a clearance 29 is formed between the outer tube and the inner tube 21. In the outer tube 24, a spherical sliding joint 27 is formed, surrounding the bellows 22. The clearance 29 serves as a heat insulating air layer. The bellows 22 and the sliding joint 27 absorb the vibration of an engine.



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(19) 日本国特許庁 (J P)

(12) 公開特許公報 (A)

(11) 特許出願公開番号

特開平6-336921

(43) 公開日 平成6年(1994)12月6日

(51) Int.Cl. <sup>5</sup>	識別記号	庁内整理番号	F I	技術表示箇所
F 0 1 N 7/08	A			
	F			
7/14				
F 1 6 L 27/04		7123-3 J		
59/153				

審査請求 未請求 請求項の数 2 O L (全 4 頁)

(21) 出願番号 特願平5-126616

(22) 出願日 平成5年(1993)5月28日

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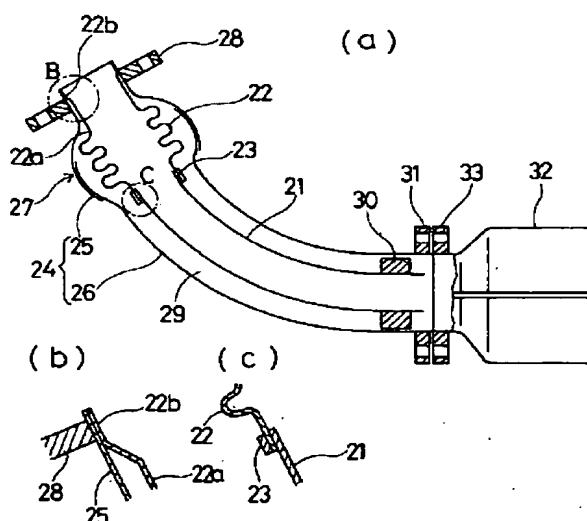
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(54) 【発明の名称】 内燃機関の排気管

(57) 【要約】

【目的】 冷間時やエンジン始動時に排ガスの温度低下を抑制して排気浄化性能を向上させるとともに、排気浄化性能の向上と振動吸収性とを両立させる。

【構成】 薄肉の内管21の一部を、更に薄肉のペローズ22で構成する。厚肉の外管24は内管21との間に隙間29を形成する。ペローズ22を囲んで、外管24が球面状の摺動継手27を形成する。隙間29は断熱空気層として働く。ペローズ22と摺動継手27はエンジンの振動を吸収する。



## 【特許請求の範囲】

【請求項1】 内管と外管との間に隙間が形成された排気管において、内管の一部にベローズ部を設けるとともに、該ベローズ部付近の外管を球面状の摺動継手に形成したことを特徴とする内燃機関の排気管。

【請求項2】 隙間に断熱材を充填したことを特徴とする請求項1の内燃機関の排気管。

## 【発明の詳細な説明】

【0001】

【産業上の利用分野】 本発明は自動車用内燃機関の排気管に関する。

【0002】

【従来の技術】 内燃機関の排気系に排気浄化用触媒コンバータを設置する場合、冷間時やエンジン始動時に排ガスの温度低下を抑制して、触媒の活性温度到達時間を早めて排気浄化性能を向上させるために、内燃機関と触媒コンバータとを連結する排気管を内管と外管とで二重に構成し、両管の間に隙間（断熱層）を形成したものがある。そして、このような排気管の途中には、エンジン振動の排気管への伝達を遮断するために振動吸収部分としてフレキシブルパイプが設けてある。

【0003】 この構造を図3に示す。1は第1の二重管で内管2と外管3で構成されている。4は二重管1の上流端（左端）に溶接されたフランジで、図示されてないエンジンに装着される。5はベローズチューブ6と金網状で通気性を有するアウトブレーダ7とからなるフレキシブルパイプ、8は内管9と外管10で構成された第2の二重管で、その下流端（右端）にはフランジ11が溶接されている。

【0004】 第1の二重管1の下流端はフレキシブルパイプ5の上流端（左端）に嵌入され、フレキシブルパイプ5の上流端外周にはバンド12が巻かれ、二重管1、フレキシブルパイプ5及びバンド12は溶接固着されている。又、フレキシブルパイプ5の下端（左端）には第2の二重管8の上流端（左端）が嵌入され、バンド13と共に溶接固着されている。

【0005】 14は触媒コンバータで、その上流端に溶接されたフランジ15はフランジ11を介して第2の二重管8の下流端に連結されている。

【0006】

【発明が解決しようとする課題】 前記従来の技術では、フレキシブルパイプ5は気密な断熱層を有していないので、この部分から外部に熱が逃げて放熱し、触媒コンバータの暖機性を著しく損なうという問題点があった。

【0007】 そのうえ、2本の二重管1、8を必要とし、構造が複雑となって、コストも高くなるという問題点があった。そこで、本発明はこれらの問題点を解消し、触媒昇温向上のための保温性と、振動（曲げ変位）吸収性の両立が可能な簡単な二重管構造の排気管を提供することを目的とする。

【0008】

【課題を解決するための手段】 前記目的を達成するために、本発明における内燃機関の排気管は、内管（21）と外管（24）との間に隙間（29）が形成された排気管において、内管（21）の一部にベローズ部（22）を設けるとともに、該ベローズ部（22）付近の外管（24）を球面状の摺動継手（27）に形成したことを特徴とする。

【0009】 隙間（29）に断熱材を充填してもよい。

【0010】

【作用】 球面状の摺動継手はシール性良好なため、内・外管の間に気密性の高い空気層（隙間）が形成され、断熱性（保温性）が改善される。同時に摺動継手の構造上、外管の高強度化が可能で、内管の板厚を薄くできる。その結果内管の熱容量が下げられ、エンジン始動時における排ガスの温度低下を抑制して触媒の昇温性を向上させられ、排気浄化性能が向上する。又、内管と外管の温度差による伸びの差で生じる軸方向の熱応力を薄板のベローズが吸収する。

【0011】 こうして、排気浄化性能と振動（曲げ変位）吸収性の両立ができる。隙間に断熱材を充填したもので、保温性の改善による排気浄化性能の更なる向上と、排気管の強度向上ができる。

【0012】

【実施例】 図1（a）（b）（c）は本発明の第1実施例で、エンジン直下のフロントパイプに本発明を適用したものである。21は断面円形の薄肉の内管で、その一部に同じく薄肉のベローズ22を接続してある。23はベローズ22を内管21に接続するバンドである。24は厚肉の外管で、第1の外管25と第2の外管26とからなり、両外管25、26は、ベローズ22を囲む部分が球面状に形成され、互に摺動可能に重ね合わせた摺動継手27を構成している。

【0013】 摺動継手27を構成する第1の外管25と第2の外管26の球面状部分は互に摺動可能に嵌合している。図1（a）ではこれら両球状部分の間に隙間があるように画かれているが、図面をわかり易くするために誇張して図示したもので、実際には隙間が殆ど無い状態で両球面状部分が摺動可能に密着嵌合している。

【0014】 第1の外管25の上流端にはフランジ28が溶接されている。又、外管25の上流端の内側には、ベローズ22の上流側円筒部22aを拡張した端部22bが溶接してある。第2の外管26の前記球面状部分の下流側は、内管21との間に隙間29を形成して、内管21を囲むように構成されている。

【0015】 30は内管21の下流端部外周にスポット溶接した環状のワイヤメッシュで、このワイヤメッシュ30は外管26との間で摺動可能に挟持されているが、必ずしも摺動可能である必要はなく、内外管端を固定してもよい。31は外管26の下流端に溶接した接続用の

フランジである。32は触媒コンバータ、33は触媒コンバータ32の上流端に溶接した接続用のフランジで、前記フランジ31に連結される。

【0016】なお、内管21とペローズ22の肉厚はそれぞれ0.8mmと0.3mm、外管25、26の肉厚は何れも1.2mmである。図2(a)(b)は本発明の第2実施例で、第1の実施例の二重構造の排気管の上流部内側に円筒形のインナパイプ34を設けたものである。インナパイプ34はその上流端を拡張して、第1の外管25とペローズ22の上流端部22bとに溶接固着

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される。このインナパイプ34はエンジンからの排ガスが直接ペローズ22に当るのを防止する。そのため、ペローズ22の温度上昇が抑えられて、その寿命が延びる。又、排ガスがペローズ22の内側に直接当たって流れが阻害されるのが少なくなり、異音の発生を防止する。

【0017】なお、図示していないが、請求項2の発明では、内管と外管との隙間29に断熱材を充填して、排気管の保温(断熱)性の向上と強度の向上を図っている。

上記実施例の他に、ペローズ及び球面状摺動継手の部分だけを、二重の管状部分と別体にして、継手ユニットとして造っておいて、この継手ユニットを二重の管状部分と接合連結してよい。

\*

\*【0018】

【発明の効果】本発明の内燃機関の排気管は上述のように構成されているので、外管に厚肉の材料を用いて強度の向上ができ、その分内管やペローズを薄肉にできてその熱容量が小さくできる。又、球面状の摺動継手の気密性がよいため、保温性(断熱性)がよい。従って、強度向上と振動吸収性の向上ができるばかりでなく、排気浄化性能も向上する。

【0019】更に又、内管と外管の温度差による伸びの差から生じる軸方向の熱応力を薄板のペローズで吸収し、耐久性が向上する。

【図面の簡単な説明】

【図1】 本発明の第1実施例で、(a)は縦断面略図、(b)は同図(a)のB部拡大図、(c)は同図(a)のC部拡大図。

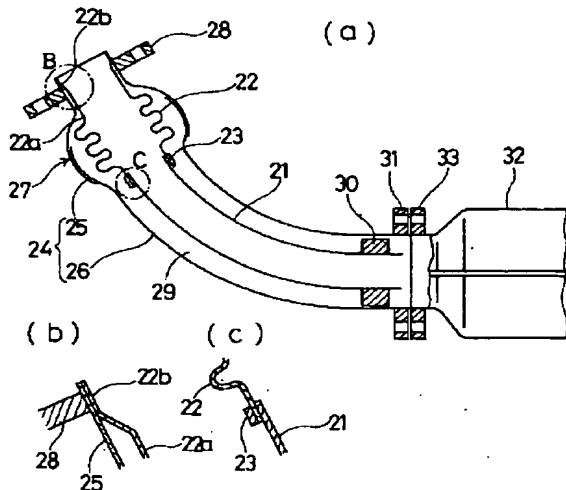
【図2】 本発明の第2実施例で、(a)は縦断面略図、(b)は同図(a)のB部拡大図。

【図3】 従来技術の縦断面略図。

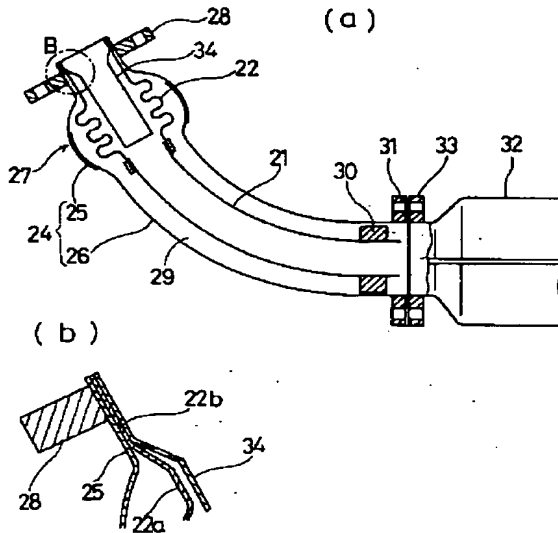
【符号の説明】

21…内管、22…ペローズ部(ペローズ)、24…外管、27…摺動継手、29…隙間。

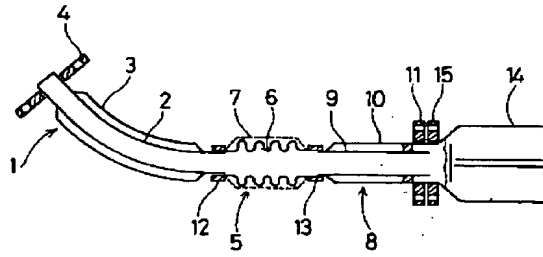
【図1】



【図2】



【図3】



# PATENT ABSTRACTS OF JAPAN

(11)Publication number : 06-336921

(43)Date of publication of application : 06.12.1994

(51)Int.Cl.

F01N 7/08

F01N 7/14

F16L 27/04

F16L 59/153

(21)Application number : 05-126616

(71)Applicant : SANGO CO LTD

(22)Date of filing : 28.05.1993

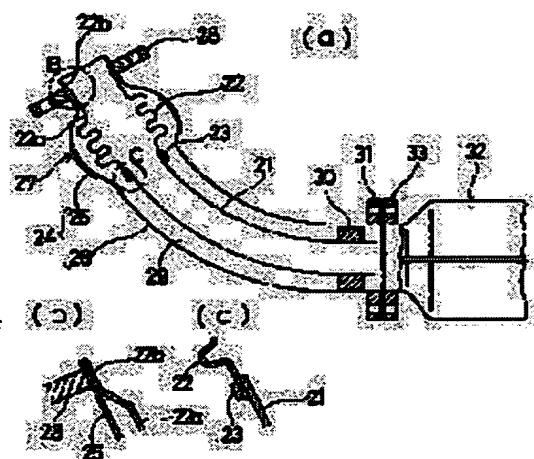
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## (54) EXHAUST TUBE OF INTERNAL COMBUSTION ENGINE

### (57)Abstract:

**PURPOSE:** To improve the exhaust purifying performance by retraining the temperature decrease in exhaust gas in cold time and at the time of starting an engine, and provide both of improved exhaust purifying performance and vibration absorbing performance.

**CONSTITUTION:** A part of thin thickness inner tube 21 is constituted of a thin thickness bellows 22. In a thick thickness outer tube 24, a clearance 29 is formed between the outer tube and the inner tube 21. In the outer tube 24, a spherical sliding joint 27 is formed, surrounding the bellows 22. The clearance 29 serves as a heat insulating air layer. The bellows 22 and the sliding joint 27 absorb the vibration of an engine.



## LEGAL STATUS

[Date of request for examination]

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

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CLAIMS

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[Claim(s)]

[Claim 1] The exhaust pipe of the internal combustion engine characterized by forming the outer tube near [ this ] the bellows section in a spherical-surface-like sliding joint in the exhaust pipe with which the clearance was formed between the inner tube and the outer tube while preparing the bellows section in some inner tubes.

[Claim 2] The exhaust pipe of the internal combustion engine of claim 1 characterized by filling up a clearance with a heat insulator.

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DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the exhaust pipe of an automobile engine.

[0002]

[Description of the Prior Art] When installing the catalytic converter for exhaust air purification in an internal combustion engine's exhaust air system, in order to control the temperature fall of exhaust gas at the time of engine starting between the colds, to bring forward the activity temperature time of concentration of a catalyst and to raise the exhaust air purification engine performance, the exhaust pipe which connects an internal combustion engine and a catalytic converter is constituted from an inner tube and an outer tube in a duplex, and there is a thing in which the clearance (thermal break) was formed among both tubing. And in the middle of such an exhaust pipe, in order to intercept the transfer to the exhaust pipe of engine vibration, the flexible pipe is prepared as an oscillating absorption part.

[0003] This structure is shown in drawing 3. 1 is constituted from the inner tube 2 and the outer tube 3 by the 1st double pipe. 4 is the flange welded to the upper edge (left end) of a double pipe 1, and the engine which is not illustrated is equipped with it. The flexible pipe with which 5 consists of a bellows tube 6 and an AUTABU radar 7 which has permeability by the shape of a wire gauze, and 8 are an inner tube 9 and the 2nd double pipe which consisted of outer tubes 10, and the flange 11 is welded to the down-stream edge (right end).

[0004] The down-stream edge of the 1st double pipe 1 is inserted in the upper edge (left end) of a flexible pipe 5, a band 12 is wound around the upper edge periphery of a flexible pipe 5, and welding fixing of a double pipe 1, a flexible pipe 5, and the band 12 is carried out. Moreover, the upper edge (left end) of the 2nd double pipe 8 is inserted in the lower limit (left end) of a flexible pipe 5, and welding fixing is carried out with the band 13.

[0005] 14 is a catalytic converter and the flange 15 welded to the upper edge is connected with the down-stream edge of the 2nd double pipe 8 through the flange 11.

[0006]

[Problem(s) to be Solved by the Invention] In said Prior art, since the flexible pipe 5 did not have an airtight thermal break, from this part, heat escaped outside, and it radiated heat outside, and had the trouble of spoiling the warming-up nature of a catalytic converter remarkably.

[0007] There was a trouble that needed two double pipes 1 and 8, structure became complicated, and cost moreover also became high. Then, this invention cancels these troubles and it aims at offering the exhaust pipe of the easy double pipe structure in which the heat retaining property for the improvement in a catalyst temperature up and coexistence of oscillating (bending variation rate) absorptivity are possible.

[0008]

[Means for Solving the Problem] In order to attain said purpose, an internal combustion engine's exhaust pipe in this invention is characterized by forming the outer tube (24) near this bellows section (22) in a spherical-surface-like sliding joint (27) in the exhaust pipe with which the clearance (29) was formed between the inner tube (21) and the outer tube (24) while it prepares the bellows section (22) in some inner tubes (21).

[0009] A clearance (29) may be filled up with a heat insulator.

[0010]

[Function] Since the seal nature of a spherical-surface-like sliding joint is good, an airtight high air space (clearance) is formed between inside and an outer tube, and adiathermic (heat retaining property) is improved. High-intensity-izing of an outer tube is possible on the structure of a sliding joint to coincidence, and board thickness of an inner tube can be made thin. As a result, the heat capacity of an inner tube is lowered, the temperature fall of the exhaust gas at the time of engine starting is controlled, the temperature up nature of a catalyst is raised, and the exhaust air purification engine performance improves. Moreover, the bellows of sheet metal absorbs the thermal stress of the shaft orientations produced with the difference of the elongation by the temperature gradient of an inner tube and an outer tube.

[0011] In this way, coexistence of the exhaust air purification engine performance and oscillating (bending variation rate) absorptivity can be performed. In what filled up the clearance with the heat insulator, further improvement in the exhaust air purification engine performance by improvement of heat retaining property and improvement in on the strength of an exhaust pipe can be performed.

[0012]

[Example] Drawing 1 (a), (b), and (c) are the 1st example of this invention, and apply this invention



to the front pipe directly under engine. 21 is the inner tube of the thin of a cross-section round shape, and has connected the bellows 22 of thin meat as well as the part. 23 is a band which connects bellows 22 to an inner tube 21. 24 is a heavy-gage outer tube, it consists of the 1st outer tube 25 and 2nd outer tube 26, and the part surrounding bellows 22 is formed in the shape of the spherical surface, and both the outer tubes 25 and 26 constitute the sliding joint 27 laid on top of \*\* possible [ sliding ].

[0013] The spherical-surface-like parts of the 1st outer tube 25 and the 2nd outer tube 26 which constitute the sliding joint 27 have fitted into \*\* possible [ sliding ]. Although it is drawn in drawing 1 (a) as a clearance is between both [ these ] spherical parts, in order to make a drawing intelligible, it is what was exaggerated and illustrated, and the both spherical-surfaces-like part is enabling adhesion fitting of the sliding in the condition that there is almost no clearance in fact.

[0014] The flange 28 is welded to the upper edge of the 1st outer tube 25. Moreover, inside the upper edge of an outer tube 25, edge 22b which expanded upstream body 22a of bellows 22 is welded. The downstream of said spherical-surface-like part of the 2nd outer tube 26 forms a clearance 29 between inner tubes 21, and it is constituted so that an inner tube 21 may be surrounded.

[0015] Although 30 is the annular wire mesh which carried out spot welding to the down-stream edge outside periphery of an inner tube 21 and this wire mesh 30 is \*\*\*\*(ed) possible [ sliding ] between outer tubes 26, it cannot be necessary to necessarily slide and an inside-and-outside tube end may be fixed. 31 is the flange for connection welded to the down-stream edge of an outer tube 26. It is the flange for connection which welded 32 to the catalytic converter and welded 33 to the upper edge of a catalytic converter 32, and connects with said flange 31.

[0016] In addition, each thickness of 0.8mm, 0.3mm, and outer tubes 25 and 26 of the thickness of an inner tube 21 and bellows 22 is 1.2mm, respectively. Drawing 2 (a) and (b) are the 2nd example of this invention, and form the inner pipe 34 of a cylindrical shape inside [ upper section ] the exhaust pipe of the dual structure of the 1st example. The inner pipe 34 expands the upper edge, and welding fixing is carried out at the 1st outer tube 25 and upper edge 22b of bellows 22. This inner pipe 34 prevents that the exhaust gas from an engine hits the direct bellows 22. Therefore, the temperature rise of bellows 22 is suppressed and the life is prolonged. Moreover, it decreases that direct this flow is checked for exhaust gas inside bellows 22, and it prevents generating of an allophone.

[0017] In addition, although not illustrated, a heat insulator is filled up with invention of claim 2 into the clearance 29 between an inner tube and an outer tube, and improvement in the incubation (heat insulation) nature of an exhaust pipe and improvement in reinforcement are aimed at by it. Only the parts of bellows and a spherical-surface-like sliding joint other than the above-mentioned example are used as the tubular part and another object of a duplex, are built as a joint unit, and junction connection of this joint unit may be carried out with the tubular part of a duplex.

[0018]

[Effect of the Invention] Since the exhaust pipe of the internal combustion engine of this

invention is constituted as mentioned above, improvement in reinforcement is made as for it to an outer tube using a heavy-gage ingredient, the part inner tube and bellows are made on thin meat, and the heat capacity can do it small. Moreover, since the airtightness of a spherical-surface-like sliding joint is good, heat retaining property (adiathermic) is good. Therefore, it not only can perform improvement in on the strength, and improvement in oscillating absorptivity, but the exhaust air purification engine performance improves.

[0019] Furthermore, the thermal stress of the shaft orientations produced from the difference of the elongation by the temperature gradient of an inner tube and an outer tube is absorbed with the bellows of sheet metal again, and endurance improves.

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## DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

[Drawing 1] For longitudinal-section schematic drawing and (b), at the 1st example of this invention, the B section enlarged drawing of this drawing (a) and (c) are [ (a) ] the C section enlarged drawing of this drawing (a).

[Drawing 2] At the 2nd example of this invention, (a) is longitudinal-section schematic drawing and (b) is the B section enlarged drawing of this drawing (a).

[Drawing 3] Longitudinal-section schematic drawing of the conventional technique.

[Description of Notations]

21 [ -- A sliding joint, 29 / -- Clearance. ] -- An inner tube, 22 -- The bellows section (bellows), 24 -- An outer tube, 27